Effect of Cyanide on the Oxygen Consumption of Developing Ova of *Ascaris lumbricoides* var. *suum*

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This research was undertaken as a result of incomplete information revealed by the literature regarding the cyanide-sensitivity of developing pig-ascarid ova.

Using the Warburg constant volume respirometer and the technique for use of cyanide given by Robbie (1945, J. Indust. Hyg. Toxicol. 27:136-145), some indications of the materials used in embryonic respiration were suggested.

Four concentrations of cyanide varying from 0.78 x 10^{-3} to 5.6 x 10^{-3}M HCN were utilized in the experiments on the uncleaved eggs and for those in the 2-4 celled stage. As yet, these are the only stages in the embryogeny of this organism that have been investigated.

A typical experimental run involved.

1) 5 experimental manometer flasks containing a given cyanide concentration, *Ascaris* saline solution, and a given number of *Ascaris* eggs.
2) 4 control flasks containing *Ascaris* saline, *Ascaris* ova and 5% KOH in the center well. (no cyanide)
3) a flask containing distilled water for correction of barometric pressure and temperature variations in the water bath.
4) a flask (blank) containing the cyanide mixture in the center well and *Ascaris* saline in the experimental compartment. (no eggs)

The blank was used for determination of the cyanide concentration utilized, this being carried out by means of the Fisher photoelectric colorimeter.

Four concentrations of HCN varying from 0.78 x 10^{-3} to 5.0 x 10^{-3}M show a progressively powerful action in depressing respiration in the uncleaved egg. The inhibition produced by this range of HCN concentrations varied from 43 to 67% of the control value. Since the presence of cytochrome oxidase has been demonstrated in adult *Ascaris lumbricoides* var. *suum* by Laser in 1944 (Biochem. J. 38:333-338), it seems reasonable to conclude that by increasing the concentration of cyanide in the medium, a greater part of the cyanide-sensitive system was affected and that the extent of saturation of cytochrome oxidase in the cell varies directly as the cyanide concentration.

Similarly, individual experiments on pig-ascarid ova in the 2-4 celled stage were conducted at 4 concentrations of HCN. There exists a slightly different condition in early cleavage than in the uncleaved egg. It was observed that HCN produced maximum effect much earlier than in the case of the uncleaved egg. Respiration depression varied directly as the concentration of HCN in both batches of eggs but whereas a maximum effect was being approached at a concentration of 5.0 x 10^{-3}M HCN in the

case of the uncleaved eggs, the maximum effect on the 2-4 celled stage was reached at a concentration of 2.8 x 10^{-3}M HCN. Therefore a more rapid response to the action of cyanide was apparent in the 2-4 celled embryo, a maximal inhibition of 87% being evident in 2.8 x 10^{-3}M HCN.

Since the cyanide-sensitive portion of the system may be recognized by subjection to cyanide which combines with cytochrome oxidase and also since this portion of the system is identifiable with carbohydrate oxidation, certain conclusions are suggested regarding the type of food material utilized in embryonic respiration.

The uncleaved egg shows less cyanide depression effects than in the case of the 2-4 celled embryo. This suggests that initial oxidation involves more fat metabolism than in the 2-4 celled stage. This is supported by the fact that the respiratory quotient (R.Q.) during initial development in the case of the present experimental organism is 0.81 which is indicative of some fat utilization. Likewise, in the 2-4 celled stage (third day of incubation) a beginning of carbohydrate metabolism may occur as shown by a lesser cyanide-insensitive portion of respiration together with an R.Q. of 0.90.